# 66'er

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# INSTRUCTION MANUAL

Clegg

19,99

# I. INTRODUCTION

UNPACKING

The 66'er has been packed with adequate internal carton bracing and cushloning to withstand normal handling in shipment on common carriers. Examine the
carton exterior for signs of severe damage (crushing, piercing, etc.) In the
event of obvious serious damage, examine the equipment carefully to determine the
extent of internal damage, save packing naterial and make claim against transportation company.

Check all front panel controls for freedom of action and observe that all tubes and crystals are firmly seated in their sockets. Complete and mail the equipment registration card, to insure validation of warranty.

Many customers have found that saving the shipping carton and the internal rushioning is a great convenience in the event of subsequent need for reshipment or prolonged storage.

GENERAL

The Clegg 66'er has been specifically designed to provide consistent communication on the 6 meter band. This band includes frequencies used by the radio amateur as well as by Military Affiliate Radio Systems, Civilian Defense, and Civil Air Patrol. The 66'er transceiver contains a stable and sensitive receiver and a dependable 22 watt transmitter in one package.

### CIVIL DEFENSE Accessories

In addition to the characteristics which make the 66'er outstanding for Civil Defense the following accessories are available for use under all Civil Defense requirements:

Crystal Receive Adapter: Available separately as \$800-047, provides crystal receive operation on an assigned C.D. frequency and assures constant on frequency operation.

Special C.D. Case: Utilizes a heavy duty carrying handle, trap door for the crystal rec. adapter and heavy duty feet. #800-805

Transmit Crystal Modification: Allows for exact frequency control of the crystal by the use of a padder capacitor precisely set with your crystals. Tuning Controls: Transmitter controls and shafts can be quickly removed after turning to eliminate accidental mistuning by unauthorized personnel.

In order to familiarize yourself with the 66 er and its many features it is suggested that you read the instruction book completely before attempting to operate your new transceiver.

SPECIFICATIONS

### RECEIVER:

- 1. Dual Conversion with 10.7 mhz 1st IF and 456 khz Second IF
- 2. Sensitivity better than  $\frac{1}{N}$  uv. for 10 db  $\frac{S+N}{N}$
- Selectivity is 8 khz.
- Frequency coverage 49.9 to 52.1 mhz.
   Expanded tuning range available on special order.
- 5. Typical drift is less than 10 khr during warm up and less than 3 khr per hour after 20 minute warmup.
- 6. Rejection of spurious responses down more than 60 db.
- 7. AGC provides more than 10 db compression for 40 db signal increase,

# SPECIFICATIONS (Cont'd)

- 8. Squelch threshold adjustable from less than .5 My, to more than 500 My.
- Switchable ANL provides more than 20 db suppression of typical impulse noise.
- 10. Audio output greater than 2 watts.

### TRANSMITTER

- 1. High Efficiency, 22 watts input, 10 watts or more output into 52 ohm load.
- HIGH TALK POWER performance gives high level modulation to 100% with typical -56 db mike.
- 3. Harmonic outputs down more than 50 db.
- 4. Spurious outputs excluding harmonics down more than 66 db.
- Exciter stages are broadband and multitumed for quick QSY and low, low spurious (TVI) outputs.
- Built-in Push-To-Talk and provisions to automatically switch the Apollo Linear and/or an external VFO.
- 7. Audio response 300 to 3000 hz. + 3 db.
- 8. Operates with 8.3, 12.5, or 25 phz. crystals or external VFO.
- Built-in solid state power supply for both 115 volt AC and 12 volt DC operation.

# TUBE COMPLIMENT

6EH7	RF Amplifier	6KE8/2	Crystal Oscillator multiplier
6KE8	First Mixer Oscillator/Buffer	6KE8/2	to 25 mhz. Doubler to 50 mhz.
6BA6 6BA6 6BA6 12AL5	10.7 mhz. IF Amplifier Second Mixer 456 khz. Amplifier Diode Detector/ANL 3 semi-conductors	12BY7 2526 6AN8 2-6AQS	Driver (50 mhz.) Power Amplifier, Class C Two stage Audio Amplifier Receive Audio/Hodulator

# POWER SUPPLY

- Built-in 117 v. ± 5 50-60 cy. supply utilizes power transformer, solid state bridge rectifier and heavy filtering circuits.
- 2. Built-in 13.8 V.D.C. supply with a DC to AC solid state convertor.
- Separate fusing and power connectors for AC and DC operation.
   Power ratings are SO w. receive and 85 w. transmit nominally.

# SIZE AND WEIGHT

12" W. x 12" D. x 6-1/2" H. 19 1bs.

# ACCESSORIES

66'er Push-to-talk Ceramic Microphone	#551~001
66'er Mobile Mount, Adjustable	#800-802
66'er Crystal Receive Adapter (less	
crystal)	#800-047
66'er C. D. Cabinet (Special Order)	#800-805

# II. INSTALLATION

A. PRELIMINARY

It is recommended that initial operation of the 66 or be with 117 VAC until the user may familiarize himself with the tune-up and other operating procedures.

The 66'er is supplied with a pre-wired power plug for 117 VAC operation. A Jones plug is supplied for DC operation but this must be wired by you for either positive or negative ground systems. (See Fig. 2, page 5)

B. CRYSTAL INFORMATION

Transmitting crystals are available from your local electronic distributor or by special order from Squires-Sanders, Inc. The following information will be helpful for purchasing your crystals: AZ-9 AZ-Z

Type:

Fundamental Cut HC U Holder

Except for 25 mc. crystals which are 3 rd overtone

cut.

Frequency:

8,333 khz. to 8,667 khz.

12,500 khz. to 13,000 khz. ± 005% 25,000 khz. to 26,000 khz.

Capacitance:

32 of. parallel resonant.

C. OPERATION (117 VAC)

117 VAC installations are straightforward. The appropriate power plug is inserted at the rear receptable and a suitable antenna with less than 2: 1 VSWR is connected to the UHF coax connector. Either the internal apeaker or an external 3-8 ohm speaker may be used. In the former case make certain that the short patch cable with phono connectors is in place between the 4 ohm chassis output jack on the rear of the cabinet. (See Fig. 1.)

D. OPERATION (13.8 VDC)

1. Wire the 12 volt cord for either negative or positive ground system according to the diagram. (See Fig. 2)

2. With either polarity the user must also supply the two primary leads for 13.8 VDC operation. They should be connected to pins 3 and 6. Where the length of the leads between the 66'er and the 13.8 volt source is less than 4 feet, \$14 wire can be employed. Should the length exceed 4 feet a heavier gauge wire is recommended.

Remove the AC fuse.

4. Operate your 66'er according to the operation procedures in Section III., P. 7.

E. EXTERNAL V.F.O. INSTALLATION

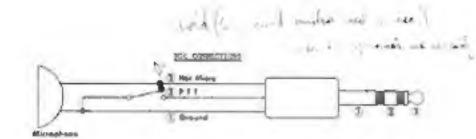
To operate the 66'er with an external V.F.O., be sure the V.F.O. has an output of 1 to 3 v. rms. at 8.3, 12.5 or 25 mhz. Connect the V.F.O. output to the 66'er crystal socket. The upper socket pin as viewed from the front is the grounded terminal. Keying of the V.F.O. may be accomplished for example, by connecting the keying circuit to JP of the 66'er, which will ground the circuit on transmit position.

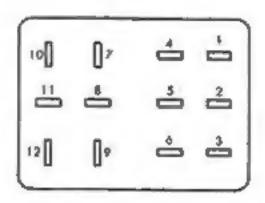
F. EXTERNAL LINEAR AMPLIFIER INSTALLATION

To operate the 66 er with an external linear amplifier simply connect the antenna output of the 66'er to the linear antenna input. Antenna switching must provide bypassing the linear in receive mode. (This is normally provided within the linear.) The 66'er provides approximately 10 watts at 50 ohms output for linear operation. Amplifier switching may be done by utilizing J6 of the 66'er which completes your linear switching circuit to ground,

66'er SIX METER TRANSCEIVER - REAR VIEW

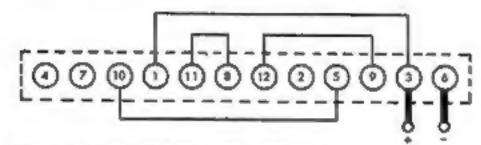
Pig #1





DC PLUG FIN LOCATIONS

# PIH - FOR 13.8 VDC POS, GND, OPERATION



PIC - FOR 13,8 VDC NEG, GND, OPERATION

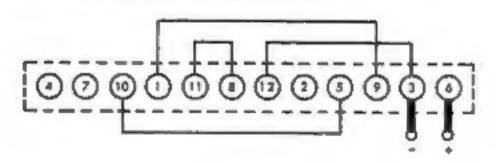


Fig. #2

Fig. #3 56'er FRONT VIEW

L13 and C92 comprise a selective impedance match into the grid of (13 (2£26), which operates as a Class C power amplifier with plate and screen modulation provided through transformer T4. The leakage reactance of T4 and capacitor C102 combine to form an effective low pass splatter filter.

The microphone output is amplified in V7B (6AN8) and further amplified in V7A. On transmit both V8 and V9 are in parallel to furnish the necessary audio power for modulation of the 2E26 stage. Operating levels of the 6AQ5's are such that grid clipping and plate bottoming occur at approximately 10 watts audio level and over modulation is prevented. As noted earlier potential high frequency splatter components are filtered by the design constants of the modulation coupling components.

All transmit-receive switching functions are performed by the four poles of the L2V DC relay, Kl. These functions are:

KLA	Antenna Transfer
B	Modulated B+
C	250 volts
D	Speaker

In the transmit mode the "D" pole of K1 is employed (in addition to disabling the speaker) to ground auxiliary jack, J6 for control of external devices such as VFO, linear amplifier, external receiver muting, etc.

KI is normally controlled by the push-to-talk action of a microphone. External and/or remote control of RI is provided by J3.

# C. POWER SUPPLY

The combination power supply furnished with the 66 er operates from  $117\pm5$  volt  $60\pm5$  eps. or 13.8 V  $\pm$  .5 VDC.

The unit has a built-in 12 volt DC supply which may be converted to either positive or negative ground systems by properly wiring the DC plug.

A full wave bridge rectifier and filter is employed on both DC and AC operation. Selection of AC or DC is performed automatically by selection of the appropriate plug, PlA, B, or C. DC to DC (12 to 300 volts) voltage inversion is performed by Q1 and Q2 and related circuitry.

Q1 and Q2 are operated at approximately 150 cps. in the common emitter mode to yield a highly efficient inverter.

¢/2

2N2869 2N2869

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12BY 7 6KE8

2E26

# III. OPERATION

# A. RECEIVER SECTION

- 1 Plug in proper Power Connector as shown in Section II and connect 50 ohm 6 meter antonna system to the antenna connector. See p 4 for locations.
- 2 Advance the RECEIVER AUDIO control from the AC OFF position and allow 1 - 2 minutes for warm up time.
- Turn the SQUELCH control toward full clockwise position.

4. Set SPOT NORMAL-AND to NORMAL. Procede with tuning of signals

5 After 5-10 minute operation, the S-Meter ZERO ADJUST may be set by adjusting this control on the rear of your 66 er. See p. 4 for location.\*

6. Insert suitable crystal into the panel crystal holder See p. 3 Crystal Information: These may be purchased at your local distributor or mail order house. Turn the SPOT-NORMAL-AND switch to SPOT. The 6 meter frequency of the crystal may now be tuned in or the receiver. To determine the exact frequency mulciply the crystal fundamental by 6 (if 8.3 mhz type). For example: 8360 x 6 = 50,160 khz.

 Where ignition or other impulse noise becomes objectionable, such noise may be reduced appreciably by placing the SPOT NORMAL-ANL switch to the

ANL position

8. The 66'er has a sensitive, stable squelch system. Threshold sensitivity can be varied from less than 5 uv. to several hundred uv by means of the panel SQUELCH control. Where equelch operation is not desired, this control should be set fully clockwise. Where only strong signals are to operate the squelch system, the SQUELCH control should be set near the lower portion of the range.

The squeach circuit is intentionally of the "leaky" type in which some receiver audio output can always be heard. When a station is received at sufficient strength to activate the squelch, output will intense from a low level to a suitable comfortable level approximately 20 db louder.

# B. TRANSMITTER SECTION

 Install a suitable crystal into the panel crystal socket Be sure the crystal meets the specifications shown above in Step 5, Receiver Section and Section B. of page 3

Connect a high impedance push-to-talk microphone with a properly wired plug into the MIC jack. See the diagram on page 5 for connections. The Squires-Sanders #551 OC. microphone is recommended and is available from your local electronics distributor.

Set the SPEECH GAIN control on rear of chass, s to mid range position

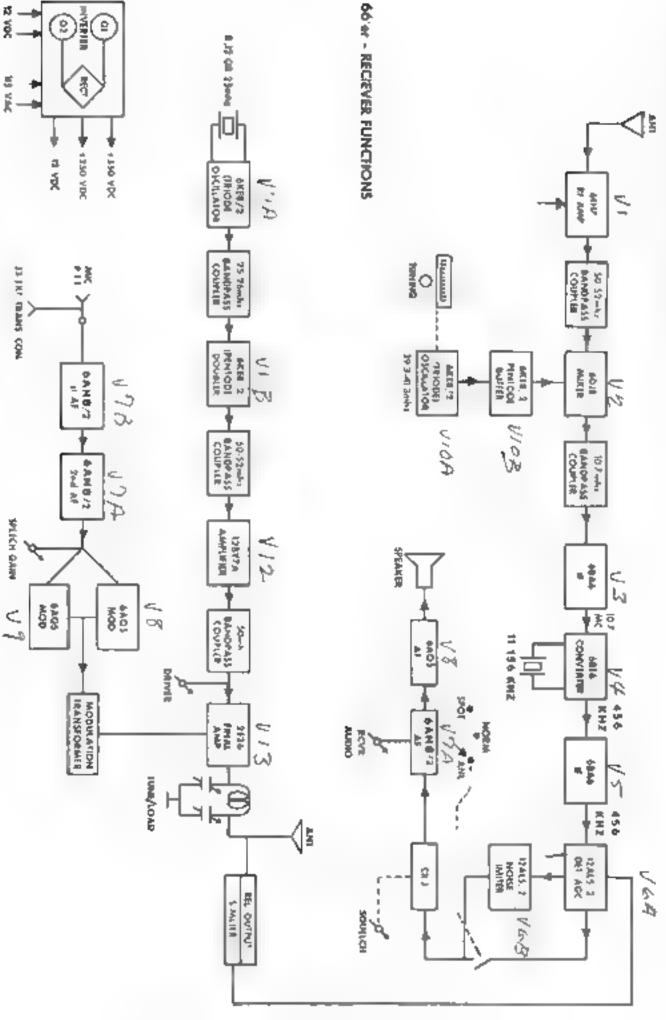
See page 4 for location

4 Depress the push-to-talk button or the microphone and adjust the DRIVER TUNE, and LOAD controls for maximum reading on the S Meter. The S-Meter will read near midscale with 13 watts or more output if the antenna VSWR is seen unity.

 Speak into the microphone and advance the SPEECH CAIN control until a alight flicker of the S Meter is observed. This completes the trans-

mitter tuneup and operation.

\* Temporarily remove the antenna for this adjustment.



### IV. THORRY OF OPERATION

### A. RECELVER

1 6EH?) is a high gm pentode operated as low roise RF amplifier with band pass coupling (50 - 52 m/z ) into V2 (6DJ8) V2 is a low-noise first conversion stage to 10.7 mhz. first IF.

Injection at the signal frequency minus 10.7 mhz. is provided by ViO (6KES) where the triode section is utilized as a stable 39 3 to 41 3 mhz. tunable oscillator and the pentode stage performs as a buffer amplifier.

10.7 mhs. output from V2 is amplified in V3 (6BA6) and converted to 455 Khs. in V4 (6BE6). Self excitation of this conversion is used with the injection frequency at 11.156 Khs. established by the crystal, Y1.

15 (68A6) provides amplification at the 455 Rhz. second IF frequency.

V6A (1,2 12AL5) functions as a conventional dipde AM detector. AGC voltage is generated by this same stage and applied to v3, V4, and V5 directly. AGC to opposite the conventional city (1884). Philadelphia the convention of AGC to W1 worth comparatively large input signals exist.

V6B (1 2 12AL5) serves as a series gate impulse noise limiter.

Diode CR 3 functions as a series squelch diode and is arranged to open the audio circuit between the detector output and the first audio stage whenever its cathode is more positive than its anode voltage. Anode voltage is varied automatically by the screen voltage of VS, which inherently follows the AGC level. Cathode voltage (of CR3) is preset to the desired threshold level by means of SQUELCH control, R 41.

Receiver audio gain is controlled by R 44. To prevent the setting of R 44 from influencing audio gain when the 66'er is in the transmit mode, CR 4 is utilized as a diode switch closed in the receive mode only by application of suitable bias via R 45 and R 46.

V7A functions as a conventional audio stage as does V8 (6AQ5) in the receive mode. (R 56, the Transmitter Speech Caio Control is deactivated in the receive mode by diode CR 5 in a manner similiar to that described for CR 4 above.)

# B. TRANSMITTER

VILA (6KE8 triode section) functions as a Colpitts crystal oscillator. Output at crystal harmonics (25 to 26 mhz.) is band pass coupled to VILB (6KE8 pantode section.) VILB is a frequency doubler to 50 - 52 mhz. and is also band pass coupled to VIZ (128Y7), the driver stage. Considerable reduction in spurious output is achieved by using straight through operation in the driver stage.

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# 66'ER ALICHMENT PROCEDURE

# I Front End & I. P. Alignment:

A. Front End Alignment

Equipment: Sweep generator Jerrold #601 or equivalent, production scope - or equivalent, signal generator, H P 608 or equivalent.

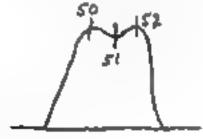
Connect Jerrold Sweeper (via coax.) to 66'er antenna connector and set Jerrold to:

> Freq. - 15-65 HC. Sueep Width - 3 Center Freq. - 5-9 ALC - 50% Attenuator - 20 db in

- Connect HP 608 (via coax.) to antenna connector through a 1PF capacitor. This is being used as a marker.
- 3. Disconnect VLO B+ (at load and H-74 22K 2W)
- 4. Connect AC coupled scope (via coax.) to pin 3 of V-2 and set scope to

External Sync. Vartical Att. to 2V. (Pull Scale) Sync. in via coax, from Jerrold

- Turn on 66'er. Using 608 as a marker adjust Jerrold center froq. to center scope display at 51 mc. Increase 608 output as necessary to provide visible marker.
- 6. e) Adjust 12 and 13 to center response on 51MC marker



b) Check response width with marker at 50 6 52 mc Response should be as shown. c) If too wide, cut off "gimmick" on 13 a little at a time, readjusting 1.2 & 13 as necessary to obtain response shown.
50 & 52 must be down less than 1 db.

### B. I F. Alignment

Equipment: Signal generator B.P. #608 or equivalent, VIVM RCA #WV7/E or equivalent, short clip lead (3").

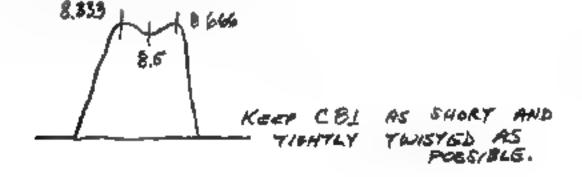
- Connect HP 608 to entenne connector (via coax.) and set freq. to .0.7 ar weardelated
- 2. Connect YTM ( 5v scale) to junction R-33, C 35 (AGC Buss)
- 3. Short automa connector to pin 2 V2 via clip lead
- a) Increase 608 output antil AGC voltage reaches -ly.
  - b) Adjust 14, 15, T1, T2 and T3 for maximum AGC voltage
  - c) Reduce 608 output as necessary to maintain 1v.
  - d) Repeat step b until there is no change.

### II Pransmitter Alignment & VLO Tracking

### A. Transmitter A.ignment

Equipment: Monitor scope
8 mc sweep generator (with 8 333, 8.5 and 8.666 xtg. markers)
Dummy Load/watt mater
13 V.D.C. Supply
Production scope
Shorting mic. plug

- Bemove B+ from fina. amp, v13 (2826).
- 2 Connect sweep output to ztal socket of 66'er,
- 3 Connect scope vert to junction R77, C83 (cold side of L-10).
- 4 Insert shorting ping in mic socket.
- 5 Adjust 19, C81 and L10 for response shown.



- Move scope probe to junction \$82, C88.
- 7. Connect A jumper across C92.
- 8. Set L11 & L 12 for response shown.



11. Remove probe and swcop connections.

# B. Montralization & Power output tempor By from 13

- 1. Connect RF detector to antenna connector.
- 2. Insert 8.666 mc, xtal and tune xmtr for max, R.F. output indication.
- Neutralize by clipping "CN" until indication is at minimum.
- 4. Disconnect RF meter and connect Dummy load/wattmeter.
- 5. Replace B+ connection to V13.
- 6. With 8.66 mm, stal. tune for max. and record on test data sheet.
- 7. Insert 8,33 mc xtal and tune for max, output 10 watts.
- 8. Insert 8,500 mc stal and tune for max. output 10 watts.
- 9, Plug in mic and check modulation on wattmeter & monitor.
- 10. Replace AC cord with BC cord connected to 13 vdc supply.
- 11. Repeat step 6 above. Min 8 watts.

# III Final Test

### A. Calibration

Equipment: RP 608
Speaker/Aud

Speaker/Audio VTVM

Dunmy Load/Wattmeter

Xtala 8.333, 8.500, 8.666 mc.

- 1. Connect VLO B+.
- Set dial pointer at left marker. Check VLO tuning-capacitor (C-61) at max. (full mesh).
- Set C-15 & C-2 at half way points.

# Page four

- Connect MP-608 (via. coax.) to antenna connector. Set HP-608 to 51 mc. (30% IKC 50 UV).
- Set 66'er disi to 51 mc. Tune L-8 & C-15 for max. Signal on audio VTVM commected across speaker leads.
- Reduce HP-608 output to .5 uv. Check still audible. Then reduce HP-608 output to zero.
- 7. Insert 8.333 mc. xtal and set 66'er to spot.
- 8. Set dial to 50 mc. and tune L-8 for max. output. (s-Mater)
- 9. Insert 8,666 mc, xtal, and set dial to 52 mc. Adjust C-62 for max. output.
- 10. Repeat steps 8 & 9 until 50 & 52 mc, are on calibration.

# B. Equalch (0.5 uw 1 kg, 30%)

 Set HP-608 & dial to 51 mc. Reduce HP-608 output to zero. Advance equelch (CCW) until just past threshold of quieting. Increase HP-608 output. Squelch must break before .5 uw of output.

# C. ARL

- 1. Set HP-608 to 2 uv (30% 1KC 51 mc.)
- 2. Turn on noise generator and loosely couple into antenna circuit.
- 3. Turn ANL on Noise should disappear from signal.

# D. Sensitivity

- 1. Set HP-608 to .6 uv. (30% I Ke 51 mg.).
- 2. Establish 0 db audio output reference with receiver audio.
- 3. Remove mod and record drop in audio output. (db) Drop must be at least 10 db at any point in the band.
- 4. Set S-meter so S-9 = 50-u-v.

# E, Audio output

 Set HP-608 to 3 uv (30% IKC 51 Mc.). Advance receiver audio until onset of audible distortion. At least 2.5 vac should be obtained.

